**1. What is MySQL?**

* **Answer**: MySQL is an open-source relational database management system (RDBMS) based on Structured Query Language (SQL). It is commonly used in web applications and is known for its high performance, reliability, and ease of use.

**2. What are the differences between MySQL and SQL?**

* **Answer**: SQL (Structured Query Language) is a language used to interact with databases, while MySQL is a database management system that uses SQL as its querying language. SQL is used to define and manipulate data, whereas MySQL is the tool used to manage databases.

**3. What is a Primary Key in MySQL?**

* **Answer**: A Primary Key is a column or a combination of columns in a table that uniquely identifies each row in that table. It must contain unique values and cannot contain NULL values.

**4. What is a Foreign Key in MySQL?**

* **Answer**: A Foreign Key is a column or a combination of columns in one table that refers to the Primary Key in another table. It is used to establish a relationship between the two tables.

**5. What are indexes in MySQL?**

* **Answer**: Indexes are used to speed up the retrieval of rows from a table. They are created on one or more columns of a table and are stored separately from the data itself.

**6. What is the difference between WHERE and HAVING clauses?**

* **Answer**: The WHERE clause is used to filter records before any grouping is done, whereas the HAVING clause is used to filter records after the grouping is done (usually with GROUP BY).

**7. What are the different types of joins in MySQL?**

* **Answer**:
  + **INNER JOIN**: Returns only matching rows between two tables.
  + **LEFT JOIN**: Returns all rows from the left table and the matching rows from the right table.
  + **RIGHT JOIN**: Returns all rows from the right table and the matching rows from the left table.
  + **FULL JOIN**: Returns all rows when there is a match in one of the tables (Not supported in MySQL directly).
  + **CROSS JOIN**: Returns the Cartesian product of two tables.

**8. What is the AUTO\_INCREMENT attribute in MySQL?**

* **Answer**: The AUTO\_INCREMENT attribute is used to automatically generate a unique number for a column (usually the primary key) when a new record is inserted into the table.

**9. What is the difference between TRUNCATE and DELETE?**

* **Answer**: TRUNCATE removes all rows from a table but does not log individual row deletions and cannot be rolled back, while DELETE removes rows one at a time and can be rolled back if a transaction is used.

**10. What is a UNION in MySQL?**

* **Answer**: The UNION operator is used to combine the result sets of two or more SELECT statements. It eliminates duplicate rows by default.

**11. What is a VIEW in MySQL?**

* **Answer**: A view is a virtual table based on the result set of an SQL query. It allows you to simplify complex queries, but it does not store data itself.

**12. What is normalization?**

* **Answer**: Normalization is the process of organizing data in a database to reduce redundancy and dependency by dividing large tables into smaller, related tables.

**13. What is denormalization?**

* **Answer**: Denormalization is the process of combining tables to improve read performance, often at the expense of increased redundancy.

**14. Explain the ACID properties in MySQL.**

* **Answer**: ACID stands for:
  + **Atomicity**: Ensures that all operations in a transaction are either fully completed or fully rolled back.
  + **Consistency**: Guarantees that a transaction will bring the database from one valid state to another.
  + **Isolation**: Ensures that concurrent execution of transactions results in a system state that would be obtained if transactions were executed serially.
  + **Durability**: Ensures that the results of a transaction are permanently stored in the database.

**15. What is a subquery in MySQL?**

* **Answer**: A subquery is a query nested inside another query, typically used in SELECT, INSERT, UPDATE, or DELETE statements.

**16. What is the difference between INNER JOIN and OUTER JOIN?**

* **Answer**: INNER JOIN returns only rows with matching values in both tables, while OUTER JOIN returns all rows from one table and matching rows from the other, filling with NULL where no match exists.

**17. What is a Stored Procedure in MySQL?**

* **Answer**: A stored procedure is a precompiled set of one or more SQL statements that can be executed as a single unit to perform a specific task.

**18. What is a Trigger in MySQL?**

* **Answer**: A trigger is a stored procedure that automatically executes when an event occurs on a particular table or view, such as INSERT, UPDATE, or DELETE.

**19. What is the difference between CHAR and VARCHAR?**

* **Answer**: CHAR is a fixed-length data type, while VARCHAR is a variable-length data type. VARCHAR saves space by storing only the required number of characters.

**20. Explain the difference between JOIN and UNION.**

* **Answer**: A JOIN combines columns from multiple tables based on a related column, while UNION combines the result sets of multiple queries into a single result set, removing duplicates.

**21. What is the LIMIT clause in MySQL?**

* **Answer**: The LIMIT clause is used to restrict the number of rows returned by a query.

**22. What are NULL values in MySQL?**

* **Answer**: NULL represents the absence of a value or an unknown value. It is different from an empty string or zero.

**23. What are the different storage engines in MySQL?**

* **Answer**:
  + **InnoDB**: The default storage engine that supports transactions, foreign keys, and ACID compliance.
  + **MyISAM**: A storage engine that does not support transactions or foreign keys but is faster for read-heavy operations.
  + **Memory**: Stores data in memory for fast access but data is lost when the server is restarted.

**24. What is the GROUP BY clause?**

* **Answer**: The GROUP BY clause is used to group rows that have the same values in specified columns into summary rows, often with aggregate functions like COUNT, SUM, AVG, etc.

**25. What is the difference between GROUP BY and ORDER BY?**

* **Answer**: GROUP BY is used to group rows based on a column, while ORDER BY is used to sort the result set.

**26. What is the LIKE operator in MySQL?**

* **Answer**: The LIKE operator is used to search for a specified pattern in a column. It supports wildcards like % (any number of characters) and \_ (a single character).

**27. What is a Composite Key?**

* **Answer**: A composite key is a primary key that consists of more than one column to uniquely identify a record in a table.

**28. What is the difference between INSERT INTO and REPLACE INTO?**

* **Answer**: INSERT INTO adds a new record, while REPLACE INTO works like INSERT, but if a record with the same primary key exists, it deletes the existing record and inserts the new one.

**29. What is EXPLAIN in MySQL?**

* **Answer**: The EXPLAIN statement is used to obtain information about how MySQL executes a query, including details about joins, indexes, and the query execution plan.

**30. What is a Database Trigger?**

* **Answer**: A trigger is a special kind of stored procedure that is executed automatically in response to certain events (like INSERT, UPDATE, DELETE) on a table.

**31. How can you optimize a query in MySQL?**

* **Answer**:
  + Use proper indexes.
  + Avoid using SELECT \*.
  + Use LIMIT to restrict result sets.
  + Use EXPLAIN to analyze query performance.
  + Avoid unnecessary subqueries.

**32. What is the difference between INNER JOIN and OUTER JOIN?**

* **Answer**: INNER JOIN returns only matching rows from both tables, while OUTER JOIN returns all rows from one table and matching rows from the other table.

**33. What is SELECT DISTINCT in MySQL?**

* **Answer**: The SELECT DISTINCT statement is used to return only unique (different